H.M. White, Inc.

Direct Gas Fired Air Supplies

H.M. White, LLC

STRAND Division

Strand Quality Air Houses Since 1947

- More than 10,000 air handlers on roofs across America
- Library of STRAND Equipment
- Manufacturer of STRAND air supply houses
- Innovators - Max Air
- Qualified Section 1000 Contractor
- ISO 9001 certified
- 66 Years Automotive/ Industrial Ventilation Experience
- Privately Owned
- Detroit and Tennessee Facilities
- Union Labeled
- Video Conferencing
- ISO 9001 Certified

What is direct gas fired?

- **Outside air heating units with gas burners, 20% Outdoor minimum requirement.**
- **Exhaust fans to minimize risk of C/O build up.**
- **Natural gas distribution system.**

Direct Fired Gas System Benefits

- **Direct fired gas-gas burned in air stream, 99% efficient**
- **Steam-coil-80% boiler efficiency + 10% piping and condensate loss, 70% efficient**
- **No distribution losses**
- **Low level of maintenance**

  (Powerhouse not required)
- **System provides ventilation air**

Direct Fired Gas System Benefits

- **System helps pressurize Plant that reduces infiltration**
- **Possible to retrofit custom steam units with gas burners**
- **Initial Cost is lower**
- **Units are lighter in weight**
- **No freezing concerns**

Direct Fired Unit

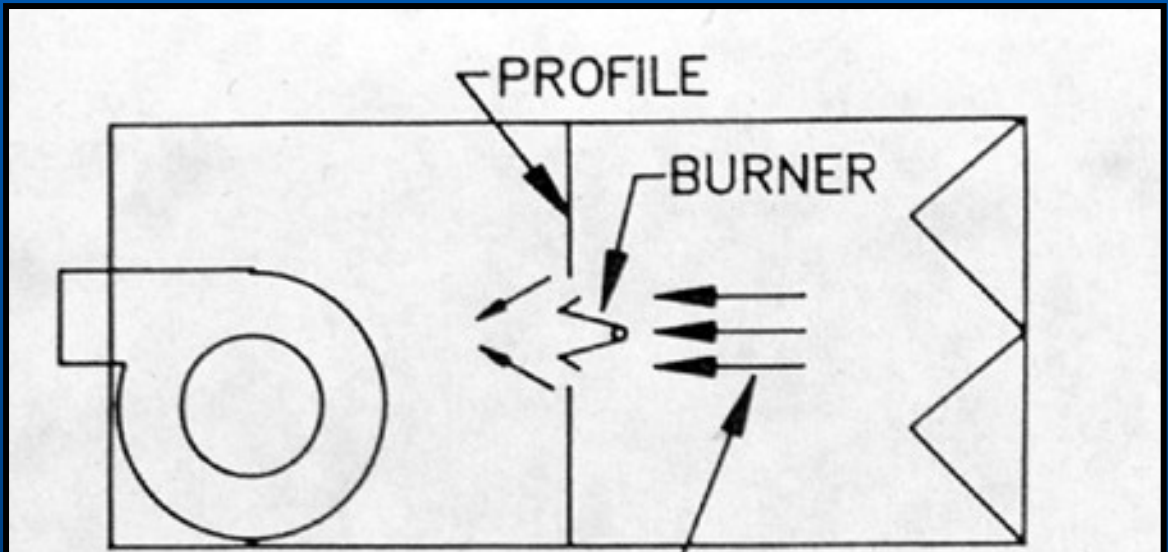


FIGURE 7–12 DIRECT FIRED UNIT

Single Steam Coil Unit

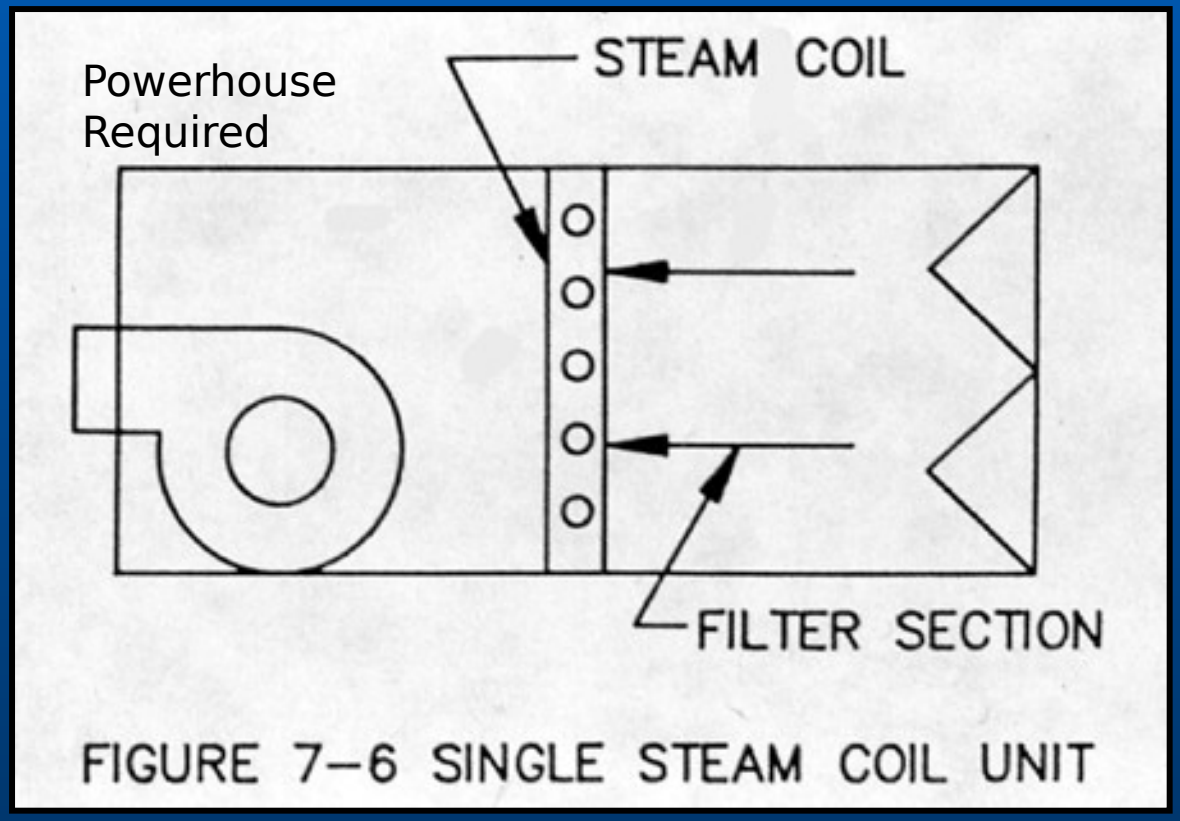


FIGURE 7–6 SINGLE STEAM COIL UNIT

Direct Fired By-Pass Unit

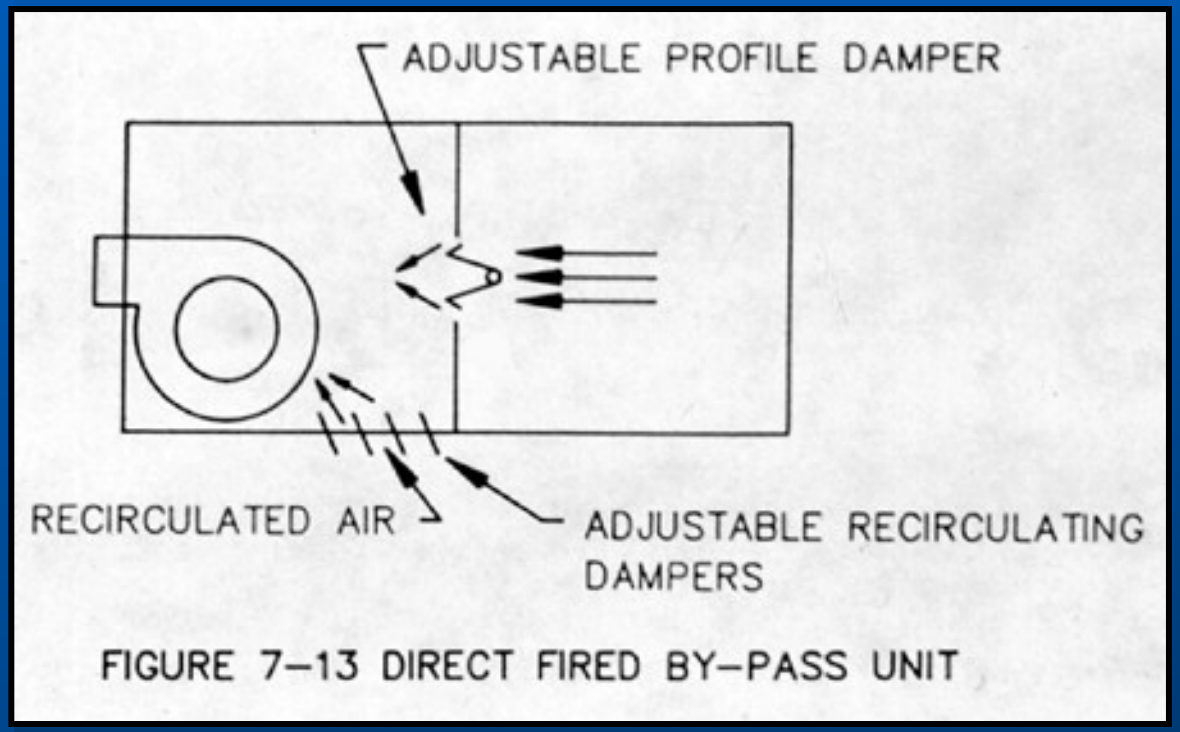


FIGURE 7–13 DIRECT FIRED BY–PASS UNIT

By-Pass Steam System

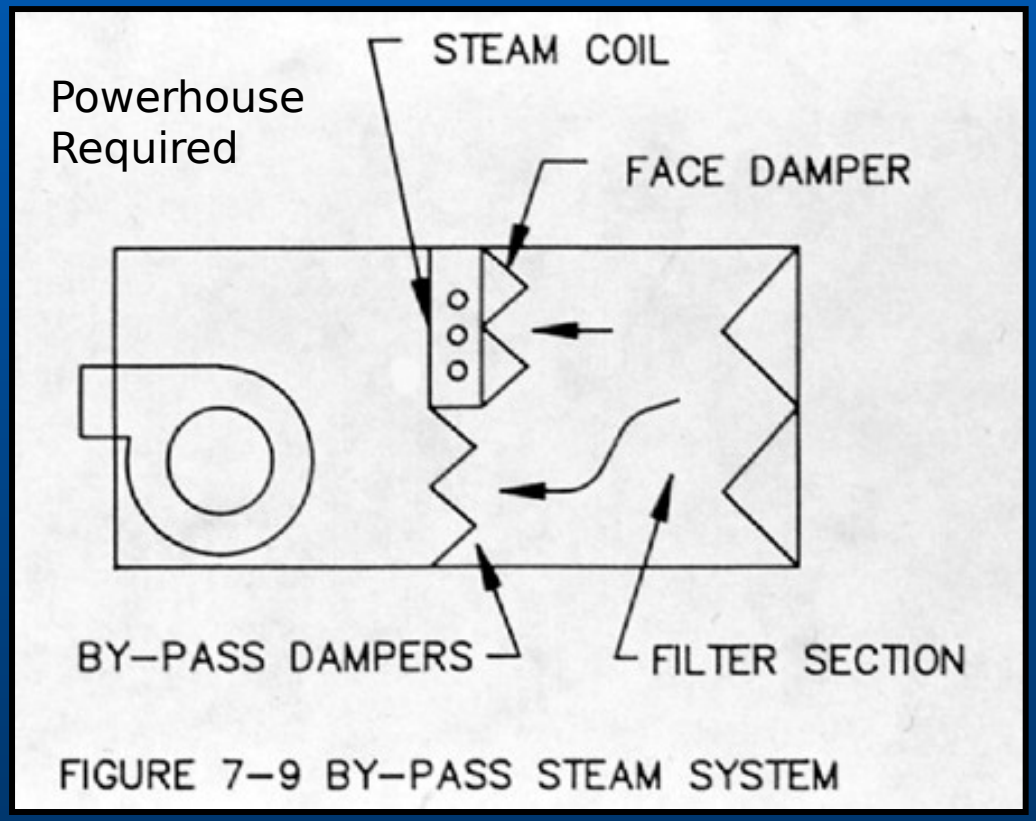


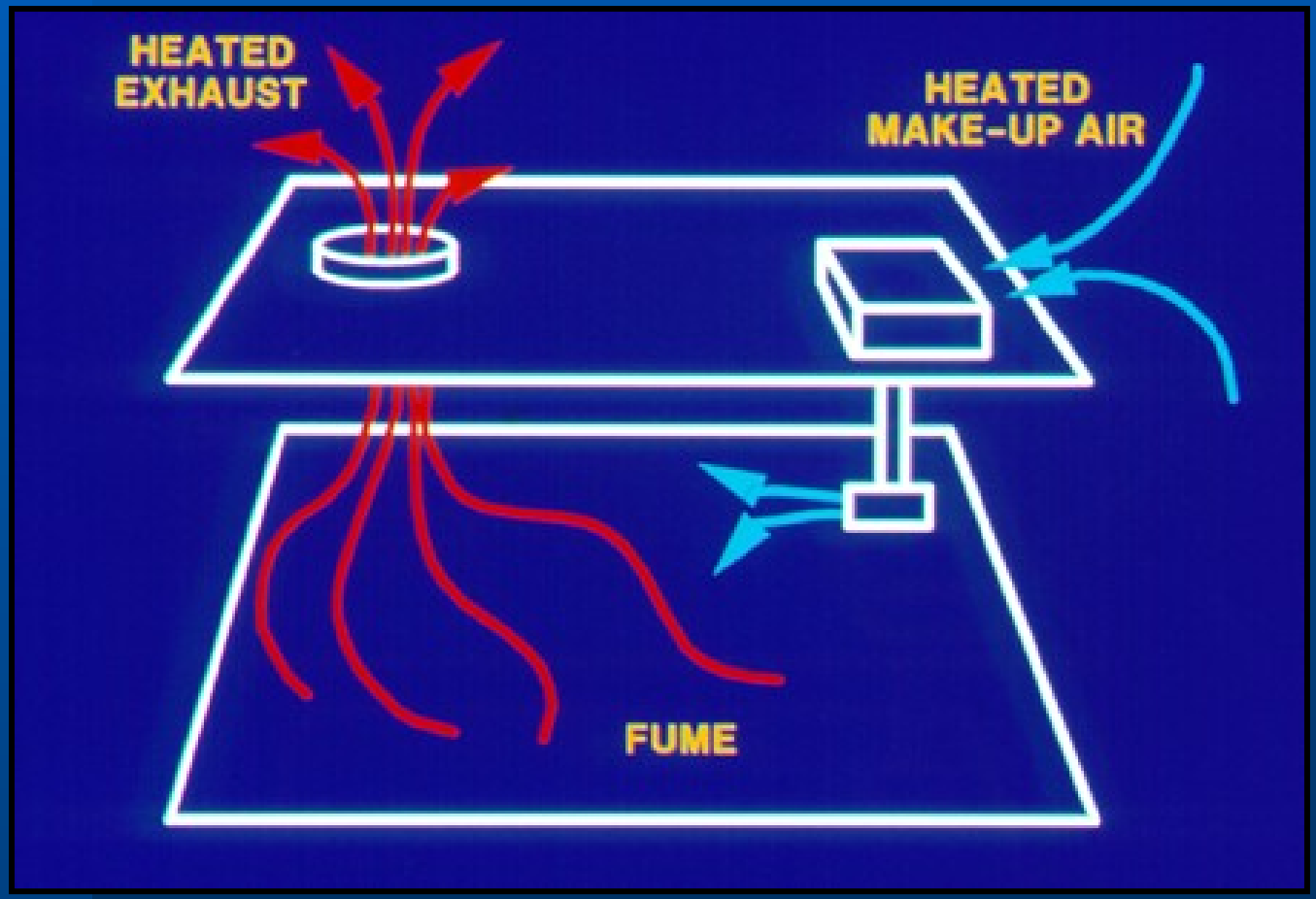
FIGURE 7–9 BY–PASS STEAM SYSTEM

Direct Fired Gas System

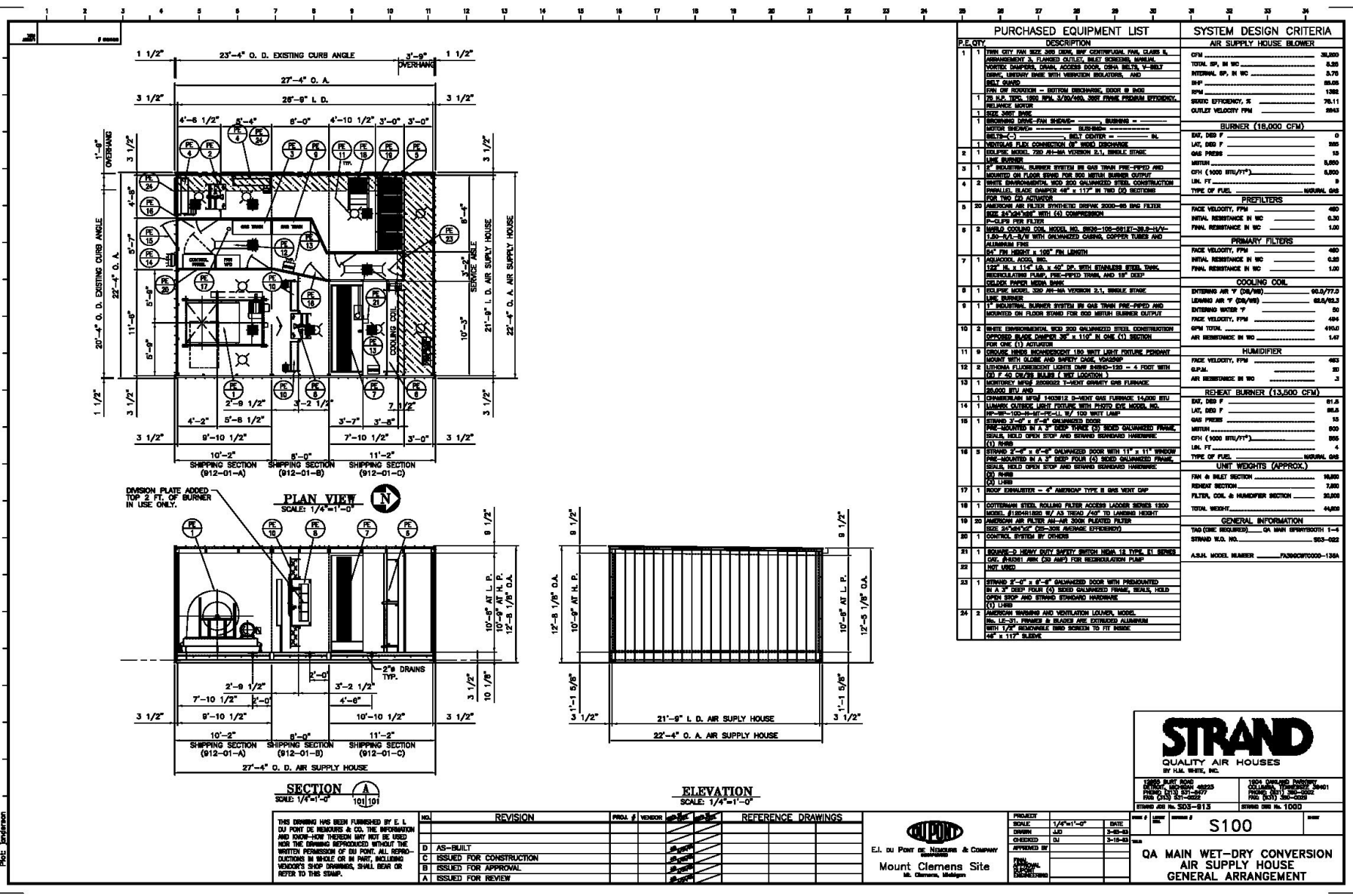
Design Issues

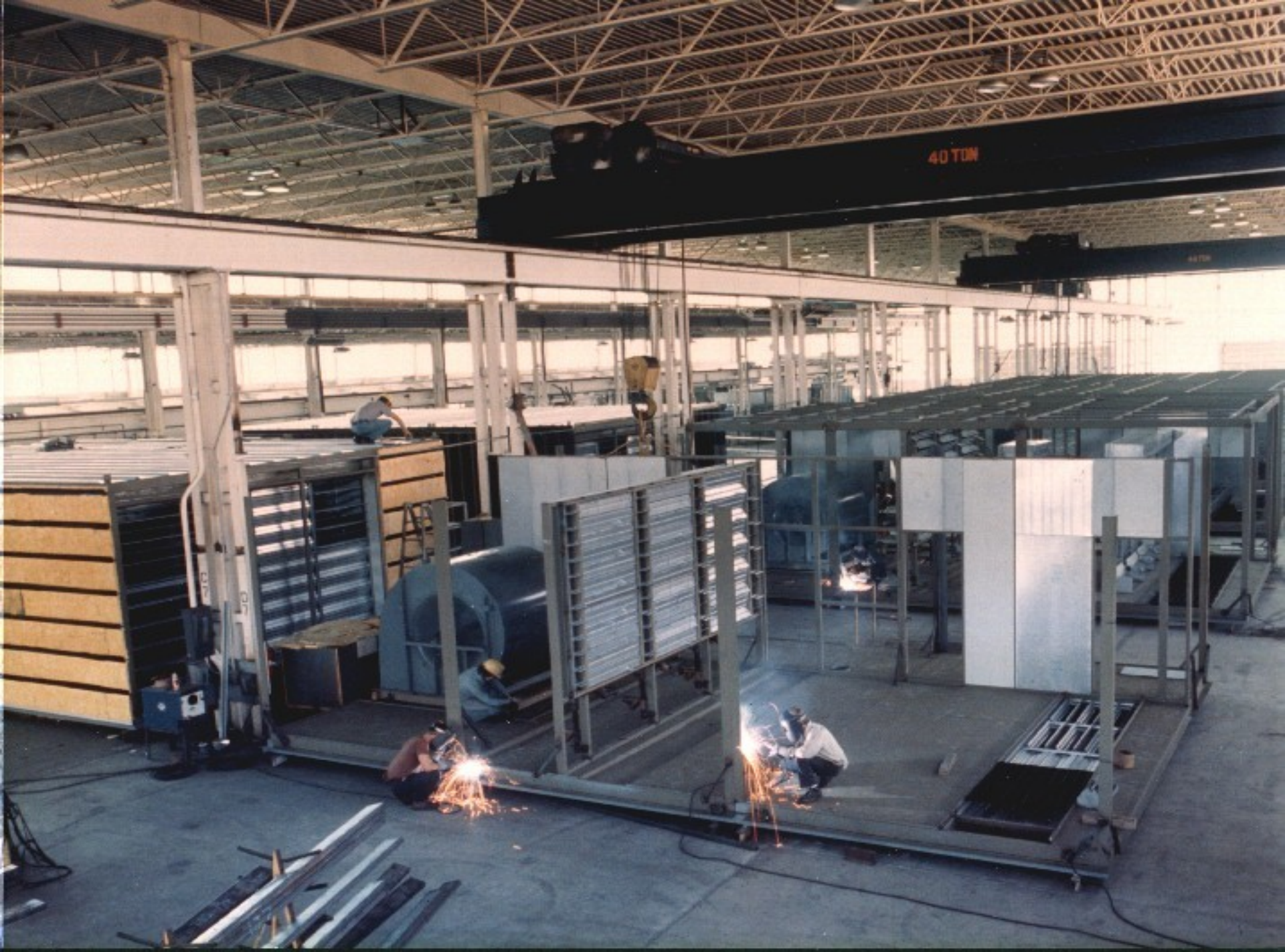
- **Only outside air can pass over burner**
- **Burner air flow must be maintained to avoid excessive carbon monoxide levels**
- **Exhaust air system required to keep air flow constant**
  - **Process**
  - **General**
- **Incoming gas monitored and controlled for safe operation**

Plant Air Flow



General Arrangement

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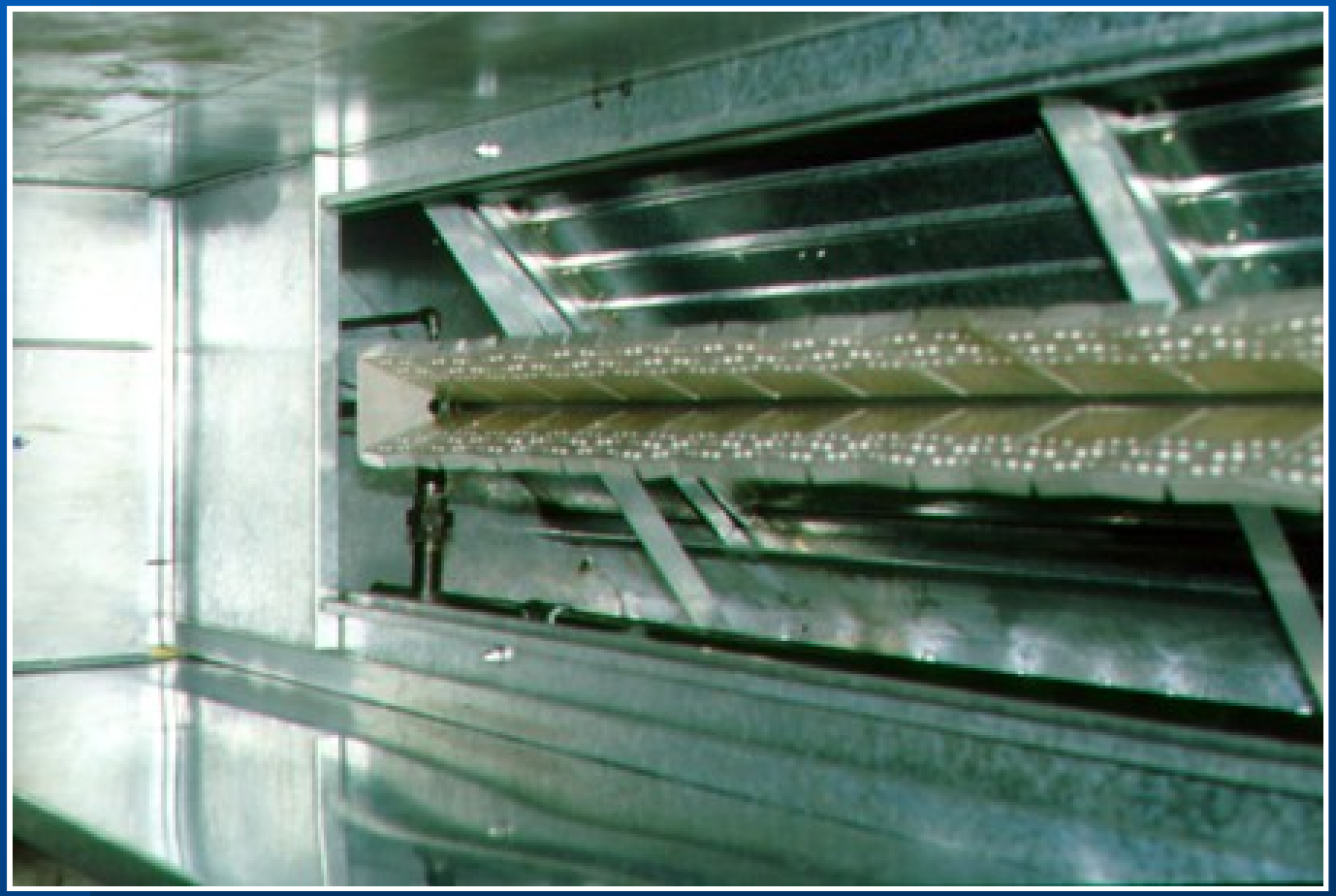
Burner



Gas Train

Controls

- **Motor and temperature**
- **Fuel safety**
- **Flame safety**

Start-up and Flame Safety Devices

- **Purge time**
  - **Four air changes to assure safe ignition**
- **Flame relay**
  - **10 Seconds to establish pilot flame**
- **Low temp limited**
  - **Discharge must reach set temperature or unit shuts down**
- **Main gas safety valves**
  - **Modulates under temperature controller**

Required Maintenance

- **Gas train inspection**
- **Burner inspection**
- **Filters**
- **Dampers**
- **Lubrication**
- **Belts**
- **Calibration**

Life Expectancy

- **20 year life span**

Steam to Gas Conversion

- **Gas line**
- **Burner Box**
- **Gas train**
- **Controls**

STRAND MAX AIR UNIT

DIRECT GAS FIRED VS. STEAM FIRED COST COMPARISON

CURRENT ENERGY COSTS

STEAM COSTS

Source	Units	Extension		Rate	Extension	Sub Total By Cost Type
GAS	0	10 6th BTU	X	3.39	10 6th btu	$ -
Steam	221,105	10 6th BTU	X	7.48	10 6th BTU	$ 1,653,865.40
			Total Current Energy Expense			**$ 1,653,865.40**

Projection of Energy Cost

Total Energy Expense	***$***	***1,653,865.40***
CFM Deliverable from Existing		1,200,000
Cost Per CFM for Energy used	***$***	***1.38***

DIRECT GAS FIRED VS. STEAM FIRED COST COMPARISON

GAS COSTS

Source	Units	Extension		Rate	Extension	Sub Total By Cost Type
GAS	221,105	10 6th BTU	X	3.3885	10 6th btu	$ 749,214.29
Steam	0	10 6th BTU	X	7.48	10 6th BTU	$ -
			Total Current Energy Expense			**$ 749,214.29**

Projection of Energy Cost

Total Energy Expense	***$ 749,214.29***
CFM Deliverable from Existing	1,200,000

Cost Per CFM for Energy used ***$ 0.62***

DIRECT GAS FIRED VS. STEAM FIRED COST COMPARISON

Savings from Steam to Gas Conversion based upon 1,200,000 cfm in Detroit Area

COMPARISON		**CFM**	**Average Rate**	**Sub Total Cost of Energy**
Steam Fired Equipment		1,200,000	$ 1.38	$ 1,656,000.00
Gas Fired Equipment		1,200,000	$ 0.62	$ 744,000.00
	Total CFM	**1,200,000**	$ 0.76	**$ 912,000.00**
			Ave unit Savings	***Potential Total Savings***
Total Savings resulting from Energy available for conversion construction				***$ 912,000.00***

Note:	Items to consider	**Recirculation for energy savings**
		Air Rotation for Heat redistribution and Recovery
		Process Changes and Building usage deviation from original design
		Actual energy costs

Questions?